

THE ECTOPSOCUS BRIGGSI COMPLEX IN THE AMERICAS

(PSOCOPTERA, PERIPSOCIDAE)

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The group of species here designated the *Ectopsocus briggsi* complex is characterized by having the wings unmarked except for a fuscous spot on the margin at the end of each vein and at the radio-medial confluence in the forewing, and in bearing a pair of slender lobes posteriorly on the margin of the female subgenital plate. The species are very much alike in body color and in structure of the genitalia.

It is the purpose of this paper to present the view that three species are present in this group in North America, to show how they may be distinguished, to show the approximate ranges of the three species in North America, to discuss the literature concerning the group in North America, and to present the first South American records of the group.

The material examined is chiefly from my own collection and that of the Illinois Natural History Survey. Also, material from the California Academy of Sciences, and the Chicago Natural History Museum was studied. The South American material is entirely from the California Academy of Sciences.

The three species in North America are *Ectopsocus briggsi* McLachlan, *E. meridionalis* Ribaga, and *E. californicus* (Banks). They may be distinguished as adults by the following key:

1. Two transverse combs present dorsally on the terminal abdominal segments males 2
 No transverse combs present dorsally on the terminal abdominal segments females 3
2. Phallic apparatus bearing a pair of thumb-like structures at its apex (fig. 249 in Badonnel, 1943); spine of paraproct margin double, the two prongs nearly equal. Clypeus straw-colored, not contrasting with vertex; spots on forewing very indistinct or absent **E. briggsi** McL.
 Phallic apparatus (fig. 3) lacking a pair of thumb-like structures at its apex; spine of paraproct margin simple. Clypeus brown, contrasting markedly with the pale vertex and frons. Spots on forewing distinct on non-teneral specimens **E. californicus** (Banks)
3. Spine of the paraproct margin simple. Gonapophyses with a clear basal articulation (fig. 1) **E. californicus** (Banks)
 Spine of the paraproct margin double. Gonapophyses without a clear basal articulation (fig. 5) 4
4. Apical lobes of subgenital plate long, rather straight, with a definite line extending forward from the inner base of each lobe (fig. 7). The two prongs of the double paraproctal spine markedly uneven in length (fig. 6) **E. meridionalis** Rib.
 Apical lobes of subgenital plate relatively shorter than in fig. 7, decidedly curved inward, and each ending in a decided smooth-margined process between the inner two setae (fig. 7 in Jentsch, 1939). The two prongs of the double paraproctal spine nearly equal in length (fig. 8 of ♂, same in ♀) **E. briggsi** McL.

Ectopsocus briggsi McLachlan

This species was first described from England (McLachlan, 1899) and has since been found in Continental Europe (Jentsch, 1939; Söfner, 1941; Badonnel, 1943) and the Belgian Congo (Ball, 1943). In the Americas, it is now known from California, the Mexican Plateau, and Chile. The female was adequately described and figured by Jentsch (1939), and the male genitalia were figured by Badonnel (1943).

Records.—UNITED STATES. **California**, Marin Co., Inverness, Oct. 30, 1946, E. S. Ross, 3 ♂, 8 ♀; Marin Co., Taylor State Park, May 18, 1952, beating dead leaves (Madrone?), H. S. Dybas, 6 ♂, 8 ♀, 2 nymphs; Marin Co., Mt. Tamalpais (east slope), May 14, 1952, dead leaf of Manzanita?, H. S. Dybas, 4 ♂, 4 ♀; Alameda Co., Niles Canyon nr. Pleasanton, Aug. 30, 1953, beating rhododendron, E. L. Mockford, 3 ♂, 2 ♀; Mendocino Co., 8 miles south of Piercy on U. S. Highway 101, Sept. 1, 1953, beating redwoods and broadleaf trees, E. L. Mockford, 2 ♀, 1 nymph.

México, Chapingo near Texcoco, Aug. 29, 1958, E. L. Mockford, 5 ♂, 3 ♀; **Morelos**, Mountains above Cuernavaca, el. 5000', Aug. 27 and 28, 1958, E. L. Mockford, 2 ♀; **Puebla**, 5 to 6 miles southwest of Teziutlan, el. 7000', Aug. 16 and 19, 1958, E. L. Mockford, 5 ♂, 3 ♀.

CHILE, Zapallar, Ancou, Nov. 27, 1950, Ross and Michelbacher, 2 ♂, 9 ♀.

Ectopsocus californicus (Banks)

Peripsocus californicus Banks, 1903:237.

Although Banks' description of this species is very brief, it contains several features which I hold to be diagnostic. The description of the wing spotting places the species in the *E. briggsi* group. The type locality at Berkeley, California, restricts the species to two possibilities. The statement "Head pale, nasus brown . . . legs pale" cannot apply to *E. briggsi*, but applies readily to the other species occurring on coastal California. In the latter species the brown elypeus contrasts markedly with the pale vertex and frons, and the pale legs contrast with the brown thoracic pleurae. These characters are readily visible at low magnification (10X) in this species, whereas at the same magnification *E. briggsi* appears uniformly straw-colored on the head, thorax, and legs. Also, Banks' statement "Easily known by the ten dots on wings" cannot apply to *E. briggsi* in which the dots are very pale and sometimes absent, whereas in this species the dots are very prominent.

A morphological diagnosis of this species is obtainable from my key and from the accompanying genitalic figures. The large sac-like structure shown in fig. 1, which lies between the gonapophyses of the two sides is apparently associated with the opening of the spermathecal duct and is absent in *E. briggsi* and *E. meridionalis*.

The species is restricted to the Pacific Coast of North America from Central California to southern British Columbia (see map).

Records.—California. Marin Co., Mt. Tamalpais, east slope, May 14, 1952, H. S. Dybas, 1 ♂, 5 ♀; Alameda Co., Niles Canyon near Pleasanton, Aug. 29 and 30, 1953, E. L. Mockford, 2 ♂, 2 ♀; Humbolt Co., Willow Creek, Sept. 2, 1953, beating dry bay leaves, E. L. Mockford, 2 ♀.

Oregon. Corvallis, Aug. 23, 1944, elm and maple, 1 ♂, 1 ♀, G. F. Knowlton.

Washington. Port Townsend, June 29 and July 5, 1948, E. L. Mockford, 1 ♂, 9 ♀.

British Columbia. Bowen Island, June 23, 1940, H. H. Ross, 6 ♀; Vancouver, June 30 and July 1, 1940, H. H. and J. A. Ross, 1 ♂, 1 ♀.

Discussion.—It may be seen from the distribution records and map that the range of this species overlaps that of *E. briggsi* in California. In one instance I have collected both species on the same plants (rhododendron) at the same locality. The way is now open for investigation of biological and ecological relationships between the two species in their area of overlap. There can be little doubt that the two species are very closely related, hence investigation of their niches and of their isolating mechanisms should produce results of considerable significance.

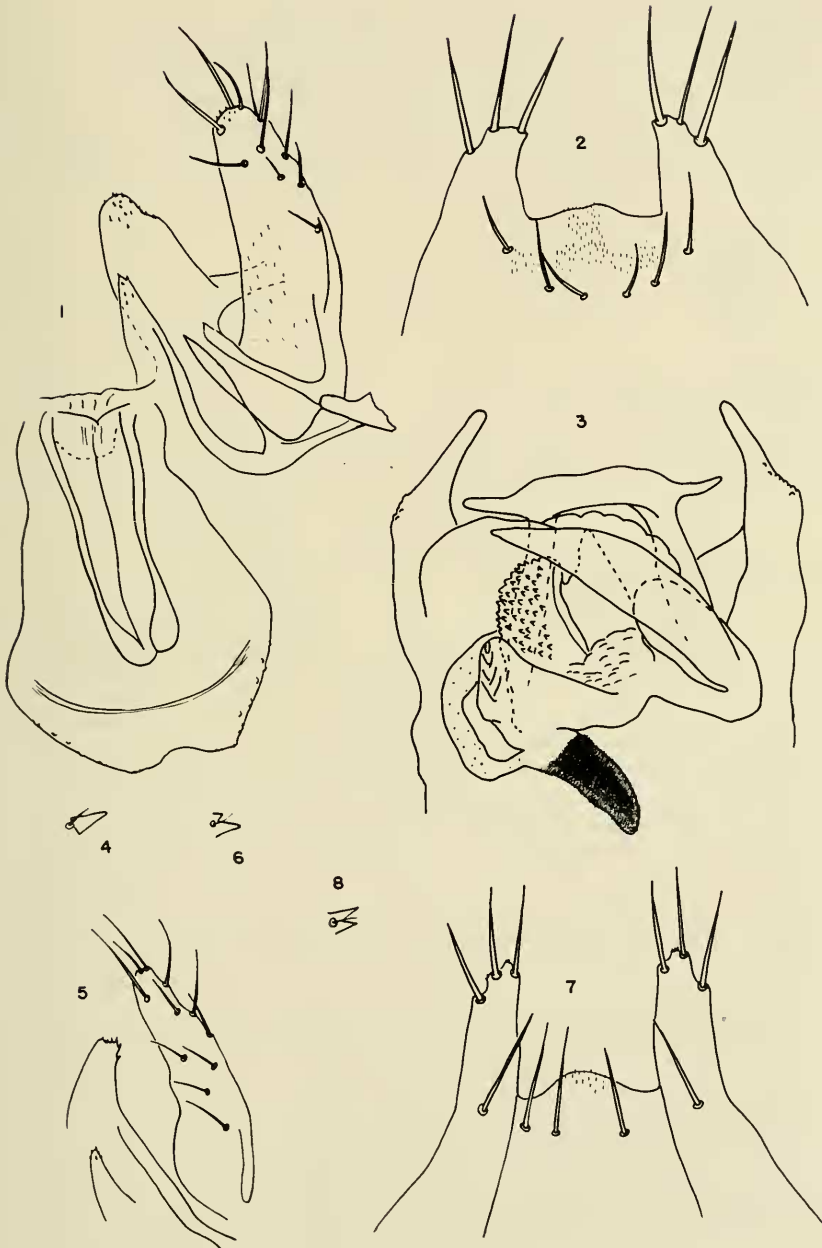
Ectopsocus meridionalis Ribaga

This species was first described from Italy (Ribaga, 1904), and has since been reported in Germany (Jentsch, 1939; Söfner, 1941) and France (Badonnel, 1943; figure of female called *E. briggsi* is this species). It also occurs in the Belgian Congo (Ball, 1943) and in French Camerouns (Badonnel, 1943a). In North America it occurs in the eastern United States from central Illinois, central Indiana and Connecticut south to Peninsular Florida, with its western limit probably in the Ozark Region. It is known from several localities in the Mexican plateau (see map). It is also known from Colombia in South America.

Records.—Those of Chapman (1930) for *E. californicus* from eastern United States, also the following:

EASTERN UNITED STATES. **Alabama,** Cleburne Co., Mt. Cheaha summit house, Aug. 19, 1951, *ex* dry leaves on branch, E. L. Mockford, 1 ♀, 2 nymphs; Pike Co., Pancassins, Aug. 20, 1951, E. L. Mockford, 1 ♀. **Arkansas,** Benton Co., Rogers, June 1 to 12, 1946, M. W. Sanderson, 15 ♀, 1 nymph; Rogers, July 7 to 14, 1949, Sanderson and Stannard, 8 ♀; 9 miles east of Rogers, July 9 and 11, 1949, Sanderson and Stannard, 7 ♀. **Connecticut,** Mt. Carmel, Oct. 7, 1943, dried leaves, K. M. and A. H. Sommerman, 1 ♀. **Florida** (all collections by E. L. Mockford), Alachua Co., Newnan's Lake, Feb. 29, 1952, 1 ♀; same locality, March 28, 1952, 2 ♀; 1 mile east of Gainesville, Dec. 5, 1953, 2 ♀; Levy Co.,

Ectopsocus californicus (Banks). Fig. 1, gonapophyses and associated structures (♀), x440; fig. 2, subgenital plate (♀), x440; fig. 3, phallic sclerites (♂), x440; fig. 4, spine on median margin of paraproct (♀; essentially same in ♂), x700. *Ectopsocus meridionalis* Ribaga ♀. Fig. 5, gonapophyses, x440; fig. 6, spine on median margin of paraproct, x700; fig. 7, subgenital plate, x440. *Ectopsocus briggsi* McLachlan, ♂. Fig. 8, spine on median margin of paraproct, x700.



Seahorse Key, June 28, 1953, 2 ♀, 1 nymph; Liberty Co., Torreya State Park, June 3-4, 1952, 4 ♀; same locality, June 4, 1953, 1 ♀; same locality, March 27, 1954, 1 ♀; Sarasota Co., Myakka River State Park, April 12, 1952, 1 ♀. **Georgia**, DeKalb Co., Fort McPherson, June 12 to Aug. 20, 1943, light trap, H. Hoogstraal, 3 ♀; Morgan Co., Hard Labor Creek State Park, Sept. 1, 1951, E. L. Moekford, 3 ♀, 2 nymphs; Deatur Co., Woodruff Dam Site, June 2, 1953, E. L. Moekford, 15 ♀, 14 nymphs. **Illinois**, Pope Co., Bell Smith Springs, July 16, 1947, L. J. Stannard, 1 ♀; Pope Co.,



North American distribution of the *Ectopsocus briggsi* complex.

Dixon Springs, Aug. 22, 1944, Sanderson and Leighton, 1 ♀, 1 nymph; Monroe Co., Burksville, June 29, 1949, Smith and Stannard, 1 ♀; Union Co., Union County State Forest, July 18, 1947, L. J. Stannard, 1 ♀; Union Co., Jonesboro, July 26, 1951, Sanderson and Richards, 1 ♀; Union Co., LaRue, Oct. 26, 1944, Ross and Sommerman, 7 ♀; Pulaski Co., Karnak, June 23, 1932, Ross *et al.*, 1 ♀; Gallatin Co., Pounds Hollow Lake, July 19, 1944, Ross and Leighton, 1 ♀; Urbana, Jan. 23, 1941, U. of I. Floriculture greenhouse, K. M. Sommerman, 11 ♀; same locality but outdoor station, Oct. 14, 1944, K. M. Sommerman, 1 ♀; same locality, Oct. 21, 1944, K. M. Sommerman, 3 ♀. **Indiana** (all collections by E. L. Moekford), Bloomington, May 26, 1949, 1 ♀; same locality, Oct. 22,

1949, 1 ♀; same locality, Sept. 18, 1950, 3 ♀, 3 nymphs; same locality, Oct. 13, 1950, 1 ♀; same locality, July 11, 1951, 16 ♀, 1 nymph; same locality, Aug. 10, 1951, 9 ♀; Indianapolis, Oct. 8, 1954, E. L. Moeckford, 3 ♀; 1 nymph. **Louisiana**, Grant Parish, Dry Prong, May 7-8, 1954, H. S. Dybas, 9 ♀. **Maryland**, Frederick Co., Catoctin Mt. Park, Aug. 28, 1955, E. L. Moeckford, 1 ♀, 1 nymph. **Tennessee**, Great Smoky Mountains National Park, Sept. 1, 1948, Ross and Stannard, 8 ♀; same locality, July 10, 1949, E. L. Moeckford, 3 ♀; Rock City, Lookout Mt., June 9, 1955, H. S. Dybas, 1 ♀. **Virginia**, Newport News, Aug. 15, 1944, Ruth Stone, 1 ♀; Cumberland Co., Cumberland State Forest, Sept. 10, 1955, M. Byrd, 1 ♀; same locality, Oct. 16, 1955, M. Byrd, 5 ♀.

MÉXICO. **México**, 15 miles east of Lerna, Aug. 30, 1958, E. L. Moeckford, 1 ♀; **Morelos**, mountains above Cuernavaca, el. 5000', Aug. 28, 1958, E. L. Moeckford, 18 ♀; Puebla, 5 to 6 miles southwest of Teziutlan, el. 7000', Aug. 16 and 19, 1958, E. L. Moeckford, 22 ♀.

COLOMBIA. No locality or date, *ex* orchids, 18 ♀, 2 nymphs.

Discussion.—In Mexico the range of this species coincides with that of *E. briggsi*, and the two species may be found in exactly the same areas. This situation offers another opportunity for the study of niche relationships between closely related species. The question of isolating mechanisms does not arise in this case, however, as *E. meridionalis* is completely isolated by its parthenogenesis.

North American literature.—It is now necessary to try to determine which species was meant in each of the literature references to this group in North America.

Banks described *Peripsocus californicus* in 1903 with its type locality at Berkeley, California. I have shown above which one of the two California species Banks had before him.

Chapman (1930) apparently looked at Banks' type but did not study it closely. He placed the species in the genus *Ectopsocus* and treated all U. S. specimens of the *E. briggsi* group under the name *E. californicus*. His material consisted largely of females from the eastern states. That the latter were *E. meridionalis* there can be little doubt, for his figure of the female genitalia is of this species. The details of the genitalia of *E. meridionalis* are known through a publication by Jentsch (1939) which also contains what I believe to be a convincing argument that the name is properly applied. Accordingly, I have cited Chapman's eastern records in my records of *E. meridionalis* without having examined the specimens. Chapman's figure of male genitalia shows the true *E. californicus* and is an accurate drawing, though small.

McClure (1936) and Sommerman (1943) have reared material which they called *E. californicus* from the University of Illinois greenhouses and have shown parthenogenesis, with complete absence of males for this form. I have examined a preserved sample of the material reared by Sommerman, and I find it to be *E. meridionalis*. This species is parthenogenetic in Europe (Ribaga, 1904; Weber, 1931) and males are unknown.

Söfner (1941) has already pointed out that the material studied by McClure (1936), and the female genitalie figure of Chapman (1930) represent *E. meridionalis*. She followed Badonnel (1932) in placing *E. californicus* in the synonymy of *E. briggsi*, a conclusion which is erroneous.

Mockford (1950, 1952) published records under the name *E. californicus* from Indiana. These records are all for *E. meridionalis*.

Summary.—The *Ectopsocus briggsi* complex in the Americas consists of three species. *E. briggsi* occurs in California, parts of Mexico, and Chile. *E. meridionalis* occurs in the Eastern United States, parts of Mexico, and Colombia. *E. californicus* occurs on the Pacific Coast from California to British Columbia.

North American authors have generally referred to any members of this group as *E. californicus*. I have attempted to determine which species is meant in each case.

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